

When is Foreign Aid Policy Credible? Aid Dependence and Conditionality

Jakob Svensson*

Institute for International Economic Studies
Stockholm University

First draft: November 1994

This version: October 1995

Abstract

In spite a vast amount of both theoretical and empirical work on foreign assistance and development, little is known about the incentive effects of aid. In fact, recent surveys of aid only briefly mention the possibility of moral hazard situations in the recipient-donor relation, but conclude that conditionality is a way to deal with the problem. However, in this paper we show that an aid contract, as proposed in the literature, is not time-consistent. This may be one explanation for the poor results of the vast amount of foreign aid disbursed to the developing world. Moreover, we show that tied aid, or delegation to a donor agency with less aversion to poverty may improve the equilibrium for all parties in the discretionary environment. Finally, we provide some evidence supporting the basic idea of the paper, namely that aid induces weak fiscal discipline and that increased fiscal difficulties lead to higher inflow of aid.

*I am grateful for many useful comments and suggestions by Torsten Persson. I also thank Gunnar Jonsson, Paul Klein, Peter Norman, Gérard Roland and Peter Svedberg, and participants in seminars at Institute for International Economic Studies, the Workshop in Development Economics in Gothenburg, and the Development Economics Conference in Bergen for comments. Correspondence to: Jakob Svensson, IIES, Stockholm University, 106 91 Stockholm, Sweden. E-mail: svenssoj@iies.su.se.

1. Introduction

Aid has grown dramatically in the post-war period, increasing by 5 percent per annum in real terms over the period 1970-1990, to reach almost US\$ 58 billion by the end of the 1980s. During the last two decades, nearly US\$ 715 billion in 1985 prices has been disbursed to the developing world, corresponding to an annual aid flow of roughly 0.34 percent of total GNP in the OECD countries. For many developing countries, foreign assistance is the most important source of external resources. However, the importance of official assistance varies considerably across countries. Table 1 reports some basic data on aid flows to the developing world.

What has this vast amount of foreign aid achieved? The sizable literature on the effects of aid can roughly be divided into microeconomic evaluations of projects, and assessments of the macroeconomic impact of aid. White (1992) summarizes the result of this literature with the so called macro-micro paradox, concluding that, whilst micro-level evaluations have been, by and large, positive, have those of the macro evidence, at best, been ambiguous.

The macro-micro paradox raises questions of the efficiency of aid and aid policy. Even though the state of the art is somewhat unclear, some general conclusion have emerged in the literature. First, the weak macroeconomic performance in many developing countries is largely due to unsound domestic policies in the recipients countries. Second, conditionality is a way to deal with such macroeconomic mismanagement. Finally, the most efficient way to give aid is through untied program support.¹ Hence, tying aid to a specific source within the donor country is bad for the poor in the recipient country, and is viewed only as a method to increase the commercial impact of the aid program. Moreover, there exists a large literature criticizing the policies of the World Bank and the IMF, arguing that a donor with stronger emphasis on poverty alleviation will strike a better balance between efficiency and flexibility.²

In this paper we shall see that once we start looking at incentive effects of aid these statements need to be rethought. The idea is straightforward. If the recipient government expects that budget deficits will be balanced by increased aid flows, it may lack the incentive to avoid deficits in the first place. In principal, an aid contract may partly overcome these this moral hazard effect, balancing optimal budget support with optimal incentives. However, without a commitment technology, such a contract is difficult to enforce. *Ex post* it is optimal for an altruistic donor to no longer withhold aid to those in most need. The anticipation that this will happen will in turn affect the recipient's choice *ex ante*.

This idea is closely related to the theory of soft budget constraints and the literature on samaritan's dilemma.³ The main differences being that we explicitly consider

¹See Cassen (1986) and Krueger (1989) for support of this view and for references.

²See for instance Havnevik (1987) and discussions in Summers et al. (1993).

³See Kornai (1980a,b) for discussions and Dewatripont & Maskin (1991) and Qian & Roland (1994) for models of the soft budget constraint. The samaritan's dilemma is formalized in Lindbeck

a macro model of foreign aid allocations and deal with several recipients.⁴ More important, however, we extend the general idea in two directions. First, by looking at the donor-recipient relation in a moral hazard setting we formalize the idea of conditionality. Second, we study normative issues. More specifically, we describe two possible arrangements under which the incentives for *ex post* recontracting are eliminated and which are able to sustain the contract-outcome, namely delegation to a donor agency with less aversion to poverty or stronger emphasis on the efficiency of aid, and tied project aid.

The general idea of the paper leads to an obvious empirical implication, namely that aid induces weak fiscal discipline and that increased deficits lead to higher inflow of aid. We provide some preliminary support for this conjecture. By estimating a simultaneous system, we blend together two strands of empirical literature on aid. On the one hand the literature on the determinants of aid allocations,⁵ on the other hand, the literature on the effects of these aid flows.⁶

This paper is organized as follows. In section 2 the model is presented and the contract solutions are derived. In section 3 we study the equilibrium under discretion. Alternative aid institutions are presented in section 4, and finally, in section 5, some empirical evidence is provided. Throughout the paper, the most important results are summarized in propositions.

& Weibull (1988).

⁴There are a few other attempts to model the incentive effects of foreign aid. Pedersen (1993a,b) shows that if a country's aid worthiness is operationalized in a way that causes the inflow of aid to be higher the more unequal income distribution, aid may be counterproductive. In a one-period version of the model by Lindbeck & Weibull (1988), Bjorvatn (1994) shows that a recipient may find it optimal to create inequality in order to attract more aid. In Bjorvatn (1994) the first best is a situation with no aid. Delegation to a donor with altruism lower than a certain threshold will implement just that. As a matter of fact, since aid is given only as a result of strategic manipulations by the recipient, it is optimal to delegate responsibility to a totally selfish donor irrespective of society's true level of altruism. Neither of these papers address the problem of conditionality, nor any normative or empirical questions.

⁵See Maizels & Nissanke (1984), Frey et al. (1985), Frey & Schneider (1986) and Gang & Lehman (1990) for studies involving simple correlations and multiple regressions on cross-sectional data. See Dudley & Montmarquette (1976), Mosley (1985) and Trumbull & Wall (1994) for formal models of aid allocations.

⁶Assessments of the macroeconomic impact of aid date back at least to the study by Griffin (1970). Griffin (1970) found a negative correlation between aid and savings. This generated a series of responses. In the papers that followed substantial econometric problems were often recognized, but was not dealt with in a satisfactory manner. For instance, the possibility of simultaneous causality between aid and the fiscal variable was not taken into account. Boone (1994a,b), and to some extent Mosley et al. (1987), are exceptions.

2. A Model of Strategic Aid Dependence and Conditionality

Conditionality, and particularly macroeconomic conditionality, has emerged as an important component in foreign aid in the 1980s and 1990s. Even though conditionality may reflect bureaucratic requirements within the donor country, or simply represent a convenient method of packing and coordinating foreign assistance, the most important motive is to address possible incentive constraints in the donor-recipient relation.

The major aim of stabilization and structural reform assistance is to facilitate a move towards a sustainable fiscal situation, foremost reduced budget deficits, where the recipient can finance its own humanitarian objectives. Since aid resources are limited, an altruistic donor would like to allocate resources to those in most need. At the same time fiscal imbalances are due partly to the state of the world, partly to the adjustment effort exerted by the recipient. Given that the donor cannot perfectly monitor or verify the recipient's adjustment effort, the donor faces a standard moral hazard problem.

To concentrate on this moral hazard problem of aid, and the credibility of conditionality, we will throughout the analysis treat the donor and the recipient governments as single decision units.

2.1. The Model

Consider the following two-period model consisting of one donor and n recipients. The budget constraints are given in (2.1) and (2.2).

$$g_{1i} + e_i \leq z \quad (2.1)$$

$$g_{2i} + d_i \leq R_i \quad (2.2)$$

In period 1, recipient government i determines the allocation of a given endowment, z , between non-development spending, e.g. government consumption, g_{1i} , and productive adjustment effort or investment e_i , where $e_i \geq 0$. Government i 's resources available in period 2, R_i , depends on the adjustment effort exerted in period 1 and the state of the world. In period 2, the recipient government allocates these resources between non-development spending, g_{2i} , and development spending, d_i .

The relation between government spending, adjustment effort and the state of the world is captured in the simplest possible way. Hence, government i 's total resources in period 2 is:

$$R_i = \begin{cases} \gamma & \text{with probability } q \\ \beta & \text{with probability } (1 - q) \end{cases}$$

where $\gamma > \beta > 0$. We assume that q is an increasing and concave function of the level of adjustment effort such that $q(0) \geq 0$, $q(z) < 1$.

The donor has humanitarian motives for giving foreign aid. More specifically, we assume that aid is used to produce a good or service in period 2, denoted by h_i ,

benefiting the poor. The production process is given by the function:

$$h_i = h(a_i) \quad (2.3)$$

where a_i is the level of aid disbursed to country i and h an increasing and concave function.⁷ The poor derives utility from consuming the good, which is either produced by the donor's resources according to (2.3), or provided by the recipient government, d . Alternatively we could think of the government producing the good with a linear technology.⁸ Thus, total (public) consumption of the poor in recipient country i is:

$$c_i = d_i + h(a_i) \quad (2.4)$$

The recipient government i 's von Neuman-Morgenstern utility is additively separable and given by:

$$W_i = \delta g_{1i} + u(x_i) \quad (2.5)$$

where δ is the constant marginal utility of non-development spending in period 1, and $u(x_i)$ denotes the utility of total public spending in period 2. We assume that u is a differentiable, increasing and concave function. Furthermore, for notational simplicity, x_i is defined as:⁹

$$x_i = \min [g_{2i}, c_i] \quad (2.6)$$

The donor-agency's expected utility is:

$$E\{W_D | e_1, ..e_n\} = E \left\{ \sum_{i=1}^n u(c_i) | e_1, ..e_n \right\} \quad (2.7)$$

Thus, the donor-agency derives utility from consumption of the poor in the recipient countries. The donor is endowed with a fixed aid budget, A , implying that the donor's optimization problem is to allocate a fixed amount of aid among the n recipient countries in period 2. The budget constraint for the donor is simply:

$$A = \sum_{i=1}^n a_i(s), \quad s \in S \quad (2.8)$$

⁷The consideration of aid as a factor of production has a long tradition, dating back at least to the study by Chenery & Strout (1966). In this set-up, a_i can be interpreted either as project aid, or as program aid such as importsupport (i.e. aid used to increase the supply of necessary inputs to production). An alternative interpretation is to think of aid as pure cash transfers, but that due to bureaucratic or institutional factors the recipient has limited absorption capacity. Thus, aid will have a falling marginal product. For support of this view, see e.g. Cassen et al. (1986) and Karlström (1991).

⁸This assumption is made only for notational simplicity, and does not affect the qualitative results.

⁹A previous version of the paper derived all qualitative results below in a model with additively separable second period utility $[G(g_{2i}) + H(c_i)]$, at the cost of considerable notational complexity. Since the focus in this paper is on the adjustment effort choice, we choose the simpler functional form (2.6).

where $a_i(s)$ denotes aid allocations to country i in aggregate s , and where S is the set of all possible aggregate states. To make things simple we assume that there are only two recipients, denoted with subscripts 1, 2. This implies that there are four different aggregate states in this model:

$$(R_1, R_2) = \begin{cases} (\beta, \beta) & \text{with probability } (1 - q(e_1))(1 - q(e_2)) \\ (\beta, \gamma) & \text{with probability } (1 - q(e_1))q(e_2) \\ (\gamma, \beta) & \text{with probability } q(e_1)(1 - q(e_2)) \\ (\gamma, \gamma) & \text{with probability } q(e_1)q(e_2) \end{cases}$$

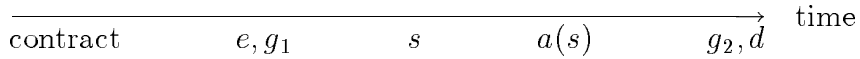
where (γ, β) denotes the aggregate state when recipient 1 is in a good state, and recipient 2 is in a bad state, and symmetrically for the other three aggregate states. For future references we define the subset of symmetric states, S_s , and the subset of asymmetric states, S_a , as: $S_s = \{(\gamma, \gamma), (\beta, \beta)\}$, and $S_a = \{(\gamma, \beta), (\beta, \gamma)\}$.

To focus on the trade off between optimal incentives and optimal budget support, we make the following implicit assumption about the parameters of the model:

Assumption 1. *It is never optimal for the donor to write a contract such that the country in a good state receives more aid than the country in a bad state.*

The timing of events are depicted in figure 1.1. In period 1, the donor proposes a contract and then the recipients simultaneously and non-cooperatively determine whether or not to accept the contract and choose the level of adjustment effort and of non-development spending. In period 2, the state of the world, s , is realized and thereafter the donor agency and the recipient governments non-cooperatively determine the allocation of aid and the composition of public funds, respectively.

Figure 1.1



2.2. Equilibrium Without Aid

The equilibrium without aid, denoted with superscripts w , is characterized by the following optimality conditions for recipient i . For a given level of government resources, R_i , the optimal composition of public spending is simply:

$$g_{2i}^{wa} = R_i/2, \quad \text{and} \quad d_i^{wa} = R_i/2 \quad (2.9)$$

Plugging (2.9) into the public consumption function (2.6), and maximizing expected utility with respect to e_i gives:

$$q'(e_i) \left[u\left(\frac{1}{2}\gamma\right) - u\left(\frac{1}{2}\beta\right) \right] = \delta \quad (2.10)$$

Equation (2.10) determines the optimal level of adjustment effort. In equilibrium, recipient government i wants to equate the expected marginal benefit of adjustment effort, the left hand side of (2.10), to its marginal cost, δ . The cost takes the form of reduced non-development spending in period 1, while the expected benefit is the product of the marginal increase in the probability of a good state times the relative change in utility of such an increase in q . Note that the equilibrium level of e depends on the productivity of adjustment effort, $q'(e_i)$, the risk aversion of the government, the difference between good and bad outcomes and the marginal utility of non-development spending in period 1. Denote the equilibrium level of adjustment effort in a situation without aid by e_i^w . Then, expected utility of recipient i in a situation without aid is:

$$E \{W_i|e_i\} \equiv W_i^w = \delta(z - e_i^w) + q(e_i^w)u(\frac{1}{2}\gamma) + (1 - q(e_i^w))u(\frac{1}{2}\beta) \quad (2.11)$$

2.3. Optimal Contract when Adjustment Effort is Observable and the Donor Can Commit: First Best

Consider now the benchmark equilibrium in which e is observable and therefore contractible. The optimal contract specifies adjustment effort for each recipient and the allocation of aid across the two countries.

In the last stage of the game, the donor-agency and the recipient governments play a non-cooperative game. The Nash equilibrium results in total spending functions similar to the optimality condition (2.9), but with R_i replaced by $R_i + h(a_i(s))$.

The optimal contract is found by solving the program of maximizing the donor's expected utility subject to the recipients' individual rationality constraints (IR) and the budget constraint (2.8). For a given level of adjustment effort, $e_i = e$, the optimal composition of aid across countries and states is defined by the following maximization program:

$$\max_{\{\mathbf{a}_1, \mathbf{a}_2\}} \sum_{i=1}^2 \sum_{s \in S} Q(s)u(C_i(s)) \quad (2.12)$$

subject to:

$$\sum_{i=1}^2 a_i(s) \leq A, \quad \forall s \in S \quad (2.13)$$

and:

$$\delta(z - e) + \sum_{s \in S} Q(s)u(C_i(s)) \geq W_i^{wa}, \quad i = 1, 2 \quad (2.14)$$

where $Q(s)$ denotes the probability of aggregate state $s \in S$, \mathbf{a}_i is a vector of aid allocations to country i for all $s \in S$, and $C_i(s)$ denotes total (public) consumption of the poor in country i in aggregate state s , given the aid inflow $a_i(s)$ and given the Nash equilibrium in the last stage. Denote the first best equilibrium with superscripts 1. Then we have the following proposition:

Proposition 2.1. *The optimal contract when e is contractible (first-best) is characterized by four conditions: (i) the first-best equilibrium entails full consumption smoothing across countries, (ii) the equilibrium aid flows are independent of the probability function q and the cost of adjustment δ , (iii) the optimal amount of effort is higher than in the equilibrium without aid, $e^1 > e^w$, (iv) the IR-constraints bind.*

Proof. The first-order conditions with respect to a_1 is:

$$Q(s) [u'(C_1(s)) h'(a_1(s)) - u'(C_2(s)) h'(a_2(s))] \quad (2.15)$$

$$+ Q(s) [\lambda_1 u'(C_1(s)) h'(a_1(s)) - \lambda_2 u'(C_2(s)) h'(a_2(s))] = 0, \text{ for all } s \in S$$

where λ_i is the Lagrange multiplier associated with the IR-constraint. By symmetry, $\lambda_i = \lambda$ in equilibrium. By concavity of $u(\cdot)$ it is the only solution. Thus, the first-best equilibrium entails full consumption smoothing across countries, independent of q and δ . At an optimum, the marginal utility of aid is equalized across countries in all states. That is: $a_1^1(s) = A/2$, for all $s \in S_s$, and $a_1^1(\beta, \gamma) = a_2^1(\gamma, \beta) > A/2$, and $a_1^1(\gamma, \beta) = a_2^1(\beta, \gamma) < A/2$.

Since the donor does not derive any utility from non-development spending, the IR-constraints bind in equilibrium. Hence, the optimal amount of effort is implicitly defined by the individual rationality constraint (2.14). That is:

$$[q(e_1)\Gamma_1 + (1 - q(e_1))\Delta_1] - [q(e^w)u(\frac{1}{2}\gamma) + (1 - q(e^w))u(\frac{1}{2}\beta)] = \delta(e_1 - e^w) \quad (2.16)$$

where:

$$\Gamma_1 \equiv q(e_2)u(C_1^1(\gamma, \gamma)) + (1 - q(e_2))u(C_1^1(\gamma, \beta)) \quad (2.17)$$

$$\Delta_1 \equiv q(e_2)u(C_1^1(\beta, \gamma)) + (1 - q(e_2))u(C_1^1(\beta, \beta)) \quad (2.18)$$

Suppose that $e_1 = e_1^w$. Then since $\Gamma_1 > u(\frac{1}{2}\gamma)$ and $\Delta_1 > u(\frac{1}{2}\beta)$ the left-hand side of (2.16) is strictly positive. So $e_1 \neq e_1^w$. Because the left-hand side of (2.16) is an increasing and concave function of e_1 , we then know that there exists two effort levels, $e_1 > e_1^w$ and $e_1 < e_1^w$, such that (2.16) holds. Note that the donor's welfare is strictly increasing e_1 . Hence, $e_1^1 > e_1^w$. Because of symmetry and concavity of q , $e_1^1 = e_2^1 = e^1$. ■

The intuition of these results is straightforward. Since effort is contractable it is always optimal to give aid to those in most need, resulting in an equalization of the marginal utilities of aid across countries in equilibrium. Moreover, since the donor does not derive any utility from non-development spending, the IR-constraints must bind. In other words, by giving conditional aid in an environment where the donor can commit, the donor in practise buys a certain amount of effort in exchange for the aid it disburses.

2.4. Optimal Contract when Adjustment Effort is Not Verifiable and the Donor Can Commit: Second Best

If adjustment effort is not observable or verifiable by the donor, enforcement of the benchmark contract may not be possible. To see this look at the recipients' incentive compatibility constraints (IC). The IC-constraint for recipient 1 can be written as:¹⁰

$$q'(e_1) [\Theta_1 - \Lambda_1] = \delta \quad (2.19)$$

where:

$$\Theta_1 \equiv q(e_2)u(C_1(\gamma, \gamma)) + (1 - q(e_2))u(C_1(\gamma, \beta)) \quad (2.20)$$

and:

$$\Lambda_1 \equiv q(e_2)u(C_1(\beta, \gamma)) + (1 - q(e_2))u(C_1(\beta, \beta)) \quad (2.21)$$

The IC-constraint (2.19) has a similar interpretation as the first-order condition (2.4). The main difference is that there are now four possible aggregate states. The left hand side of (2.19) captures the expected gain of higher adjustment effort, treating the other recipient's choice of e as given, while the right hand side is the marginal disutility of effort.

Proposition 2.2. *An aid policy according to the benchmark contract of giving aid to those in most need when e is not contractible, will result in lower adjustment effort than in the first-best.*

Proof. Due to the concavity of $u(\cdot)$ and since aid flows to a country in bad state are larger than to a country in good state: $[u_1(\frac{1}{2}\gamma) - u_2(\frac{1}{2}\beta)] > [\Theta_1^1 - \Lambda_1^1]$, implying that $e_1 < e_1^w$. From proposition 2.1 we have $e_1^w < e_1^1$. Hence, $e_1 < e_1^1$. ■

The reason for this result is twofold. First, as in a standard moral hazard model, full consumption smoothing lowers the incentive to invest or exert effort *ex ante*. Second, since the two recipients act non-cooperatively they do not take into account the effects of domestic policy choices on the other country. Given that the donor's resources are limited, the choice of adjustment effort in country i will affect the expected welfare of country j . This is so because the higher effort exerted by recipient i , the less likely it ends up in the bad state and the less likely it is that the country will receive as much foreign assistance. This in turn implies that expected aid to country j rises. Hence, there exists a positive externality between expected aid disbursement to country j and adjustment effort in country i . The recipients will not internalize this externality when choosing e , which will result in a too low level of effort.

The recipient government i 's indirect expected utility function is denoted by $v_i(e_1, e_2, a_i(s))$, where:

$$v_i(e_1, e_2, a_i(s)) \equiv q(e_1)q(e_2)u(C_1(\gamma, \gamma)) + q(e_1)(1 - q(e_2))u(C_1(\gamma, \beta)) +$$

¹⁰We have replaced the infinite set of relative incentive constraints with a single "first-order constraint" (see appendix A.2).

$$+ (1 - q(e_1)) q(e_2) u(C_1(\beta, \gamma)) + (1 - q(e_1)) (1 - q(e_2)) u(C_1(\beta, \beta))$$

and symmetrically for country 2, and where $C_i(s) = \frac{1}{2} (R_i + h(a_i(s)))$.

Definition 2.3. *The optimal contract when e is not contractible (second-best) is a vector of feasible policies $(e_1, e_2, a_1(s), a_2(s))$ such that: (i) aid allocations maximizes the donor's expected utility, $a_i(s) = \arg \max \sum_{i=1}^2 \sum_{s \in S} Q(s) u(C_i(s))$ s.t. the donor's budget constraint and the IR- and IC-constraints, (ii) $e_1 = \arg \max v_1(e_1, e_2, a_i(s))$, given e_2 , (iii) $e_2 = \arg \max v_2(e_1, e_2, a_i(s))$, given e_1 .*

The optimal contract when effort is not verifiable can only be made conditional on the observable state of the world. It is found by maximizing expected utility subject to the budget constraint (2.8), the IC-constraint (2.19), the IR-constraint (2.14), and corresponding constraints for recipient 2. Thus, for a given level of adjustment effort, $e_i = e$, the optimal composition of aid across countries states is defined by the program:

$$\max_{\{\mathbf{a}_1, \mathbf{a}_2\}} \sum_{i=1}^2 \sum_{s \in S} Q(s) u(C_i(s)) \quad (2.22)$$

subject to:

$$\sum_{i=1}^2 a_i(s) \leq A, \quad \forall s \in S \quad (2.23)$$

$$\delta(z - e) + \sum_{s \in S} Q(s) u(C_i(s)) \geq W_i^{wa}, \quad i = 1, 2 \quad (2.24)$$

$$q'(e_i) [\Theta_i - \Lambda_i] = \delta \quad (2.25)$$

where the variables Θ_2 and Λ_2 are defined as in (2.20)-(2.21), with subscript 1 replaced by subscript 2 and vice versa, $C_1(\beta, \gamma)$ replaced by $C_2(\gamma, \beta)$, and $C_1(\gamma, \beta)$ replaced by $C_2(\beta, \gamma)$.

After some algebra, exploiting the symmetry of the model, we obtain the first-order conditions of this program as:¹¹

$$[(1 + \lambda)Q(s) + \nu \hat{p}] [u'(C_1(s)) h'(a_1(s)) - u'(C_2(s)) h'(a_2(s))] = 0, \text{ for all } s \in S_s \quad (2.26)$$

and:

$$(1 + \lambda)Q(s) [u'(C_1(s)) h'(a_1(s)) - u'(C_2(s)) h'(a_2(s))] + \quad (2.27)$$

$$\nu \pi q'(e) [\check{p} u'(C_1(s)) h'_1(a_1(s)) + (1 - \check{p}) u'(C_1(s)) h'_2(a_2(s))] = 0, \text{ for all } s \in S_a$$

where ν_i is the Lagrange multiplier associated with the IC-constraints and λ_i the Lagrange multiplier associated with the IR-constraints. In a symmetric equilibrium, $\lambda_i = \lambda$ and $\nu_i = \nu$. The variables \hat{p} and \check{p} are defined as:

$$\hat{p} = \begin{cases} q'(e)q(e) & \text{in state } (\gamma, \gamma) \\ -q'(e)(1 - q(e)) & \text{in state } (\beta, \beta) \end{cases} \quad \check{p} = \begin{cases} q(e) & \text{in state } (\beta, \gamma) \\ (1 - q(e)) & \text{in state } (\gamma, \beta) \end{cases} \quad (2.28)$$

¹¹See appendix A.2.

and $\pi = 1$ in state (γ, β) and $\pi = -1$ in state (β, γ) . Denote the second-best equilibrium with superscripts 2. The following proposition summarizes the most important properties of the second-best contract.

Proposition 2.4. *The optimal contract when e is not contractible (second-best) is characterized by five conditions; (i) there is less than full consumption smoothing across countries, $a_i^2(s) = A/2$ for all $s \in S_s$, and $a_1^2(\beta, \gamma) = a_2^2(\gamma, \beta) < a_1^1(\beta, \gamma)$, and $a_1^2(\gamma, \beta) = a_2^2(\beta, \gamma) > a_1^1(\gamma, \beta)$, (ii) the optimal amount of effort is lower than in the first best, $e^2 < e^1$, (iii) the equilibrium aid flows depend on the exogenous parameters of the model, (iv) the IR-constraints do not bind, (v) the IC-constraints bind.*

Proof. If the IC-constraints do not bind, then the first-order conditions result in the first-best levels of aid flows. Hence, when there are no incentive problems, the optimal arrangement implies equalization of the marginal utilities of aid. However, when the IC-constraints do bind, implying that $\nu > 0$, the level of aid depends on the probability function q , as well as the risk aversion of the donor, the marginal utility of non-development spending, δ , and the difference between good and bad states.

To pin down the optimal effort level, define the optimal aid flows as a function of \mathbf{e} as $a_i(s, \mathbf{e})$, where \mathbf{e} is a vector of adjustment effort levels. This function is implicitly given by the first-order conditions (2.26)-(2.27). Note that, independent of \mathbf{e} , $a_i(s, \mathbf{e}) = \frac{1}{2}A$ for all $s \in S_s$. By differentiating the IC-constraints (2.19) and invoking the budget constraint (2.23), we have:

$$\frac{d}{de_1} [a_1((\gamma, \beta), \mathbf{e})] \equiv a'_1((\gamma, \beta), \mathbf{e}) = -a'_1((\beta, \gamma), \mathbf{e}) > 0 \quad (2.29)$$

and symmetrically for $a_2(s, \mathbf{e})$. That is, in order to induce the recipient to exert higher effort, the donor must lower the level of aid to countries with fiscal difficulties, and increase aid to countries in less need. By substituting $a_i(s, \mathbf{e})$ for a_i in (2.22), and using the budget constraint to substitute for $a_2(s, \mathbf{e})$, we can express expected utility as a function of \mathbf{e} only. Maximizing expected utility with respect to e_1 results in the following first-order condition:

$$\begin{aligned} q'(e_1) \left[\sum_{i=1}^2 [q(e_2) (u(C_i(\gamma, \gamma)) - u(C_i(\beta, \gamma))) + (1 - q(e)) (u(C_i(\gamma, \beta)) - u(C_i(\beta, \beta)))] \right] \\ + \frac{1}{2} \sum_{s \in \bar{S}} Q(s) a'_1(s, \mathbf{e}) [u'(C_1(s)) h'(a_1(s)) - u'(C_2(s)) h'(a_2(s))] = 0 \end{aligned} \quad (2.30)$$

and symmetrically for e_2 . Equation (2.30) compares the marginal gain of increased effort, the first term, with the expected marginal cost, the last term. The marginal gain takes the form of increased expected consumption since the likelihood of the good states increase. The cost arises because the marginal utilities of aid across the two countries are not equalized. Thus, the cost is the relative loss of not giving aid to those

in most need. Notice that if aid allocations follow the first-best levels, implying that the IC-constraints do not bind, the second term in (2.30) will vanish. In that case the first-order condition (2.30) is strictly positive. Thus, when e is not verifiable, it is no longer optimal for the donor to allocate aid so as to smooth public consumption of the poor. Or in other words, the optimal adjustment level is such that the IC-constraints bind.

Given that assumption 1 holds, it is now straightforward to show that the IR-constraints never bind. From Proposition 2.2, it follows that it is possible to implement $e_i > e_i^w$, only if more aid is given to the country in good state than to the recipient in bad state. However, by assumption this is not optimal. Thus, the recipient governments are strictly better off in the second best equilibrium, than in a situation without aid. ■

This result reproduces a standard result from the contract theory literature. The second best contract is a compromise between giving aid to those in most need and providing optimal incentives. In order to induce the recipient to exert higher effort, aid flows in bad states must be lowered and aid flows in good states raised.

2.4.1. Optimal Contract when the Recipients Cooperate

To distinguish the two imperfections that arise when e is not contractable, it is informative to consider the scenario when the two recipients cooperate. By assumption then, the coordination externality will not be present.

Definition 2.5. *The optimal contract when e is not contractible and the recipients cooperate, is a vector of feasible policies $(e_1, e_2, a_1(s), a_2(s))$ such that: (i) the optimal aid allocations maximizes the donor's expected utility, $a_i(s) = \arg \max \sum_{i=1}^2 \sum_{s \in S} Q(s) u(C_i(s))$ s.t. the donor's budget constraint and the IR- and IC-constraints, (ii) (e_1, e_2) maximize the sum of the recipients' expected utilities $v_1(e_1, e_2, a_i(s)) + v_2(e_1, e_2, a_i(s))$.*

Lemma 2.6. *A contract equilibrium where the recipients cooperate has higher levels of adjustment effort than in the second-best equilibrium, $e_i > e_i^2$.*

Proof. The IC-constraint for recipient i in the cooperative environment is found by maximizing the sum of the two recipients expected utility with respect to e_i . That is:

$$\max_{\{e_1, e_2\}} \sum_{i=1}^2 \sum_{s \in S} [\delta (z - e_i) + Q(s) u(C_i(s))] \quad (2.31)$$

Using the assumption of symmetry, the IC-constraint for recipient 1 can be stated as:

$$2q'(e_1) [\Theta_1 - \Lambda_1] + q'(e_1) [u(C_1(\gamma, \beta)) - u(C_1(\beta, \gamma))] = \delta \quad (2.32)$$

Equation (2.32) has the same interpretation as the IC-constraint (2.19), except that now the benefit of higher adjustment effort also accrue to recipient 2. In the cooperative environment the benefits of higher adjustment effort are fully internalized. Hence,

the left hand side of (2.32) is basically two times the left hand side of equation (2.19). Solving for the optimal contract, it is straightforward to show that the IC-constraints bind in equilibrium. To prove that $e_i > e_i^2$, suppose that $e_1 = e_1^2$. Then the left-hand side of (2.32) is larger than the left-hand side of (2.19), so $e_1 \neq e_1^2$. Suppose instead that $e_1 < e_1^2$. As the left-hand side of (2.32) is decreasing in e_1 , this cannot be true either. Hence, $e_1 > e_1^2$. Because of symmetry and concavity of q , $e_1 = e_2$. ■

This result is intuitive. The non-cooperative actions by the recipients introduces an additional distortion in aid assistance. In the cooperative outcome the coordination externality is internalized. This in turn reduces the cost of inducing the recipients to exert higher effort.

3. Discretion: Third Best

Contracts of the form described in section 2.3 and 2.4 have been suggested to solve the moral hazard problem present in many donor-recipient relations. However, enforcing such contracts are difficult. *Ex post*, once the recipients' choices of adjustment effort are determined and the shock realized, the donor-agency has incentives to increase disbursements to the country in most need. The anticipation that this will happen will in turn affect the incentive to carry out politically costly adjustment policies *ex ante*.

Denote the equilibrium adjustment levels in the discretionary environment as e^3 .

Definition 3.1. *The time consistent equilibrium is a vector of feasible policies $(e_1, e_2, a_1(s), a_2(s))$ such that: (i) $a_i(s) = \arg \max \sum_{i=1}^2 u(c_i)$ s.t. the donor's budget constraint, (ii) $e_1 = \arg \max v_1(e_1, e_2)$, given e_2 , (iii) $e_2 = \arg \max v_2(e_1, e_2)$, given e_1 .*

Proposition 3.2. *The discretionary equilibrium entails full consumption smoothing $a^3(s) = a^1(s)$, but too low adjustment effort, $e^3 < e^2$.*

Proof. The time-consistent equilibrium is found by backward induction. In the last stage of the game, the donor determines the allocation of aid across the two countries, taking the composition of public funds in the second period as given. The first-order condition is simply:

$$u'(C_1(s)) h'(a_1(s)) - u'(C_2(s)) h'(a_2(s)) = 0, \quad \forall s \in S \quad (3.1)$$

This condition imply aid-flows identical to the benchmark equilibrium. That is, *ex post*, aid will be allocated to the country in most need. At an optimum, the marginal utility of aid across the two countries is equalized.

In the first stage of the game the two recipients simultaneously and non-cooperatively choose adjustment effort. The equilibrium aid flows, implicitly defined by equation

(3.1), will act as incentive constraints on the recipient governments' maximization programs. Inserting these aid flows in the welfare function (2.5), and taking the first-order condition with respect to e_i , we obtain:

$$q'(e_i) [\Theta_i^1 - \Lambda_i^1] = \delta, \quad i = 1, 2 \quad (3.2)$$

It is now straightforward to show that $e_i < e_i^2$. Suppose that $e_i = e_i^2$, then $[\Theta_i^1 - \Lambda_i^1] < [\Theta_i^2 - \Lambda_i^2]$, implying that $e_i \neq e_i^2$. Suppose instead that $e_1 > e_1^2$. As the left-hand side of (3.2) is decreasing in e_i , this cannot be true either. Hence, e_i^3 is unambiguously lower than e_i^2 . Because of symmetry, $e_1^3 = e_2^3 = e^3$. ■

In other words, the donor's incentive to push the outcome towards the first-best, will drive the equilibrium towards the third-best.

The welfare implications could be summarized as follows. The donor, and the poor groups, are strictly better off in the contract equilibrium, than in the discretionary environment, while the welfare effects of the recipient governments are ambiguous. The reason for this is that, in the discretionary equilibrium the individual government does not internalize the positive externality between expected aid disbursement to country j and adjustment effort in country i . Hence, the effort choice of the government may be too low. To see this we can solve for the cooperative outcome under discretion.

Definition 3.3. *The time-consistent cooperation equilibrium is a vector of feasible policies $(e_1, e_2, a_1(s), a_2(s))$ such that: (i) $a_i(s) = \arg \max \sum_{i=1}^2 u(c_i)$ s.t. the donor's budget constraint, (ii) (e_1, e_2) maximize the sum of the recipients' expected utilities: $v_1(e_1, e_2, a_i(s)) + v_2(e_1, e_2, a_i(s))$.*

Lemma 3.4. *A time-consistent cooperation equilibrium has higher levels of adjustment effort than in the third-best, $e_i > e_i^3$.*

Proof. The first-order condition with respect to e_1 in the cooperative outcome is given in (2.32). Inserting the equilibrium aid flows under discretion yields:

$$2q'(e_1) [\Theta_1^1 - \Lambda_1^1] + q'(e_1) [u(C_1^1(\gamma, \beta)) - u(C_1^1(\beta, \gamma))] = \delta \quad (3.3)$$

It is then immediate from lemma 2.6 that $e_i > e_i^3$. ■

If the gain of increased aid flows in bad relative good states is outweighed by the loss of too low adjustment efforts, welfare of recipient government i is higher in the contract equilibrium than in the discretionary environment. In appendix A.3. we provide a numerical example when this is indeed the case.

To summarize, the presence of altruism makes contracts difficult to enforce *ex post*. In the following section we describe two arrangements under which the incentive for *ex post* recontracting are eliminated, and which are able to sustain second-best outcomes.

4. Alternative Aid Institutions

The question we ask in this section is whether it is possible to design institutions so as to push the discretionary equilibrium closer to the second best equilibrium. We consider two different scenarios. In the first one we expand the set of policy instruments available for the donor by allowing for tied project aid. In the second scenario, we introduce an additional donor with different preferences over the allocation of foreign aid.

4.1. Tied aid

In this subsection we describe an alternative method to deal with the incentive problems in foreign assistance, namely tied project aid.

Definition 4.1. *Tied aid is contracted by source to private firms in the donor country, non-financial project transfer of resources.*

Project aid in general, and tied project aid in particular, have received a great deal of attention and criticism in the aid literature. A general conclusion that has emerged from this research is that if aid is highly fungible, targeting assistance to specific projects is essentially a futile exercise.¹² Furthermore, tying aid resources by source and end use to firms within the donor country, is seen only as a way to increase the commercial impact of the aid program. However, these conclusions may in fact be reversed once we take into account how tied aid affect the time-inconsistency problem in foreign assistance.

The main reason for this result is that tied aid is contractible. That is contrary to many international agreements where there are no third party or institution that can enforce contracts, tied project aid is contractable within the donor country. Furthermore, such a contract is credible not only because of the use of legal institutions within the donor country, but because the third party involved, i.e. the private firms within the donor country, is likely to enforce the contract for profit maximizing reasons. Hence, by tying up part of the available funds the donor achieves some commitment power in the international policy arena.

To make the analysis more realistic, we will consider both the case when tied aid is as efficient as non-tied aid and the case when tied aid is less efficient. Since tied aid is likely to involve transaction and rent-seeking costs within the donor country, the second scenario is more realistic. In other words, contractibility acts as a constraint that reduces efficiency. However, it turns out that tied aid can serve a useful role even though it is only an imperfect substitute for non-tied aid.

¹²Whether or not aid is fungible is an empirical question. Boone (1994a,b) presents evidence supporting the notation of fungibility.

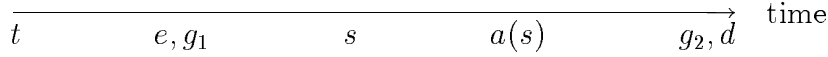
4.1.1. A modified model

We now modify the model by introducing an additional aid instrument, tied project aid denoted by t_i . We assume that the level of tied aid is determined before the outcome is realized. This seems like a reasonable timing assumption, since tied aid is an aid form which captures better commitment possibilities through the use of domestic institutions.

We assume that tied aid is less efficient than non-tied aid. Thus, a fraction μ of the resources used for tied project aid will be wasted, where $\mu \geq 0$.

The sequence of events are depicted in figure 4.1. In period 1, the donor writes contracts with domestic firms determining the level of tied aid. Then the recipients simultaneously and non-cooperatively choose the level of adjustment effort. In period 2, the shock is realized and thereafter the donor and the recipients determine the allocation of non-tied aid, and the composition of public funds, respectively.

Figure 4.1



Assume initially that $\mu = 0$, so that tied aid is as efficient as non-tied aid. Then, *ex post*, once the shock is realized and the level of tied aid determined, the donor solves:

$$\max_{\{a_i\}} \sum_{i=1}^2 u(R_i + h(a_i + t_i)) \quad R_i = \gamma, \beta, \quad i = 1, 2 \quad (4.1)$$

such that:

$$A = \sum_{i=1}^2 a_i + t_i \quad (4.2)$$

Proposition 4.2. *The donor can implement the second-best equilibrium by using a combination of tied and non-tied aid.*

Proof. If $t_1 = t_2 = a_1^2(\gamma, \beta) = a_2^2(\beta, \gamma)$, the first-order condition with respect to a_1 of the maximization program (4.1), in aggregate state (γ, β) can be written as:

$$u'(\gamma + d(a_1 + a_1^2(\gamma, \beta)))h'_1 - u'(\beta + h(a_2 + a_1^2(\gamma, \beta)))h'_2 < 0 \quad (4.3)$$

which is strictly negative as long as assumption 1 holds. Thus, it is optimal, *ex post*, to allocate all available aid to country 2. By construction, then, the total level of aid disbursed to country 2 is $a_2^2(\gamma, \beta)$. By symmetry, the opposite result holds in state (β, γ) . Given these aid-flows it follows from proposition 2.4 that it is optimal for the recipients in period 1 to choose $e_1 = e_2 = e^2$. ■

Hence, by tying up part of the available funds in tied project aid, the second-best outcome can be implemented. Note that it is not optimal to tie up all aid resources,

$t < A/2$. Thus, there exists a trade-off between flexibility and credibility. Due to the uncertain environment, it is optimal to provide more aid to countries in bad states. These resources would not be available if all aid was tied.

The intuition for this result is straightforward. *Ex post* it is optimal for the donor to equalize the marginal utilities of aid across the two countries. The recipients realize this, and will therefore choose too low effort *ex ante*. By credibly tying up part of the aid budget, the donor ties its own hands. As a result, it is no longer possible to equalize the marginal utilities of aid across countries *ex post*. Hence, the necessary incentives to induce the recipients to choose e^2 are created.

When $\mu > 0$ the second-best outcome can never be implemented. In this case, the donor faces a trade-off between waste of aid resources and creating incentives to induce the recipients to choose a higher effort. Intuitively, under discretion effort is too low whereas the allocation of aid is set optimally. At the margin it is therefore optimal to accept some waste of aid resources in exchange for higher effort *ex ante*. This intuitive argument is formalized in Proposition 4.3.

Define the indirect utility function of the donor as $w(\mu, \mathbf{m})$, where \mathbf{m} is a vector of exogenous parameters, and denote the donor's welfare under discretion as W_D^3 . Then we have the following proposition:

Proposition 4.3. *There exists a threshold value $\mu_0 > 0$ such that for any $\mu \in [0, \mu_0)$ the donor is strictly better off in the tied aid case than in the third best.*

Proof. Both the budget constraint and the donor's utility function are continuous. Hence, by Berge's Maximum Theorem the value function w is continuous in all arguments. From proposition 2.4 it follows that $w(0, \mathbf{m}) > W_D^3$. Proposition 4.2 is then immediate from the continuous property of w . ■

Corollary 4.4. *If the gain of increased aid flows in bad relative good states is outweighed by the loss, due to the coordination failure, of too low adjustment effort, there also exists a $\mu > 0$ such that the recipient governments are better off in the tied aid case than in the discretionary equilibrium.*

Proof. Immediate from proposition 4.3.

The optimal composition between non-tied and tied aid can be found in two steps. To simplify the analysis we now assume that there only exists two effort levels, e^2 and e^3 . First, denote the optimal level of tied aid to country i with t^* . Then define the aid flows that implement e^2 as a function of the efficiency parameter μ , to be $a_i(s, \mu)$, where $a_i(s, \mu)$ is the solution to;

$$\max_{\{\mathbf{a}_1, \mathbf{a}_2\}} \left[\sum_{i=1}^2 \sum_{s \in S} Q(s) u(C_i(s)) \right] \quad (4.4)$$

subject to:

$$\delta(z - e^2) + \sum_{s \in S} Q(s)u(C_i(s)) \geq W_i^w, \quad i = 1, 2 \quad (4.5)$$

$$q'(e^2)[\Theta_i - \Lambda_i] = \delta, \quad i = 1, 2 \quad (4.6)$$

$$\sum_{i=1}^2 a_i(s, \mu) \leq A^n, \quad \forall s \in S \quad (4.7)$$

and where:

$$A^n = \sum_{i=1}^2 a_i(s) + 2(1 - \mu)t^* \quad (4.8)$$

In other words, A^n is the net level of aid disbursed, i.e. $A^n = A - 2\mu t^*$.

Lemma 4.5. *If the amount of tied aid is given by: $t^* = a_1((\gamma, \beta), \mu)/(1 - \mu)$, the donor minimizes the waste of aid resources while at the same time creating incentives to induce the recipients to choose e^2 .*

Proof. Note first that it is always optimal *ex post* to allocate all available aid funds to the country in most need, implying that total aid allocated to country 2 in state (γ, β) , and symmetrically to country 1 in state (β, γ) , is equal to $a_2((\gamma, \beta), \mu)$. Notice furthermore that the IC-constraints (4.6) bind when the allocation of aid follows: $\{a_1(s, \mu), a_2(s, \mu)\}$. Hence, $t < t^*$ cannot be optimal since this would increase aid flows to the country in most need, resulting in too low effort of the recipients *ex ante*, i.e. $e < e^2$. However, then it is no longer optimal to use tied aid at all, implying that we are back to the discretionary equilibrium. On the other hand, $t > t^*$ cannot be optimal either. This is so for two reasons. First, more resources than necessary are wasted in order to create the incentives for the recipients to choose e^2 . Second, too little aid is given to the country in most need. Both effects unambiguously decrease the donor's welfare. ■

Hence, the optimal allocation of aid as a function of μ can be stated as follows:

$$t_1 = t_2 = a_1((\gamma, \beta), \mu)/(1 - \mu), \quad a_1(\beta, \gamma) = a_2(\gamma, \beta) = A - 2t^* \quad (4.9)$$

$$a_1(\gamma, \beta) = a_2(\beta, \gamma) = 0, \quad a_i(s) = \frac{1}{2}(A - 2t^*), \quad \forall s \in S_s \quad (4.10)$$

Figure 4.2 shows the result of a numerical exercise. In the figure, expected gain of combining tied and non-tied aid relative discretion for the donor and recipient government i is shown. In this specific example, combining tied and non-tied aid is welfare improving for the donor (recipient i) as long as $\mu < 0.56$ (0.11).¹³

¹³For the assumptions in the numerical example, see appendix A.3.

4.2. Delegation

A well known result from the political economy literature on monetary and fiscal policy is that delegation to an agent with different objectives may help to relax binding incentive constraints.¹⁴

In real life there are many donors interacting on the aid-scene. Of these the World Bank, and the IMF, have come to play a very important role. The policies of these institutions are often criticized for being too conservative and inflexible, pursuing policies that may increase efficiency but at the cost of increased poverty, i.e. cuts in humanitarian spending. It is argued that a more flexible donor with stronger emphasis on poverty alleviation will strike a better balance between efficiency and flexibility.¹⁵ However, as we show below, this claim may in fact be reversed. A less flexible donor, i.e. a donor with less aversion to poverty, or stronger emphasis on aggregate efficiency, will increase welfare of the poor.¹⁶

4.2.1. The Model

In order to evaluate the donors' aversion against poverty implicit in the distribution of aid, an explicit utility function is required. Hence, we assume that u is a CES-function:

$$u(c_i) = \begin{cases} \frac{c_i^{1-\theta}}{1-\theta} & 0 \leq \theta < 1 \end{cases} \quad (4.11)$$

where θ here is a measure of relative poverty aversion. The utility function (4.11) captures the trade-off between equality of consumption across countries and increase in total consumption of these countries. Notice that the donor's welfare function is utilitarian if $\theta = 0$ in which only total income counts and becomes more Rawlsian as θ increases. In other words a higher θ implies a higher aversion to relative poverty or less emphasis on aggregate consumption or efficiency.¹⁷

Denote the measure of relative poverty aversion for the altruistic donor as $\hat{\theta}$. In the previous section, we showed that the first-order condition in the discretionary environment resulted in identical aid flows as in the benchmark equilibrium. With an explicit utility function, this first-order condition in aggregate state (γ, β) can be rewritten as:

$$\left[\frac{C_1^1(\gamma, \beta)}{C_2^1(\gamma, \beta)} \right]^{\hat{\theta}} = \frac{h'(a_1^1(\gamma, \beta))}{h'(a_2^1(\gamma, \beta))} \quad (4.12)$$

¹⁴For a survey of the political economy literature, see Persson & Tabellini (1990). For a model of delegation in an international context, see e.g. Persson & Tabellini (1992).

¹⁵See for instance Havnevik (1987), and discussions in Summers et al. (1993).

¹⁶Of course, the World Bank (and the IMF) also have other aims than poverty alleviation, which may result in other binding incentive constraints, [see Rodrik (1995)].

¹⁷c.f. Behrman & Sah (1984).

implying that:

$$\hat{\theta} = \frac{\ln \hat{\Phi}}{\ln \hat{\Omega}} \quad (4.13)$$

where:

$$\hat{\Phi} = \frac{h'(a_1^1(\gamma, \beta))}{h'(a_2^1(\gamma, \beta))} \quad \text{and} \quad \hat{\Omega} = \frac{C_1(\gamma, a_1^1(\gamma, \beta))}{C_2(\beta, s_2^1(\gamma, \beta))} \quad (4.14)$$

That is, *ex post*, it is always optimal to equalize the marginal utilities of aid across countries. Evaluating equation (4.12) we see that a lower θ leads to a shift in aid flows away from the country in most need. In the limit as $\theta \rightarrow 0$, aid will be split equally between the two countries irrespective of the state of the world.

Proposition 4.6. *The second-best outcome can be implemented by delegating responsibility to a donor agency with less relative aversion to poverty.*

Proof. It is immediate from (4.12) that a donor agency with relative aversion to poverty given by θ^* , where:

$$\theta^* = \frac{\ln \Phi^*}{\ln \Omega^*} \quad (4.15)$$

and:

$$\Phi^* = \frac{h'(a_1^2(\gamma, \beta))}{h'(a_2^2(\gamma, \beta))} \quad \text{and} \quad \Omega^* = \frac{C_1(\gamma, a_1^2(\gamma, \beta))}{C_2(\beta, s_2^{sb}(\gamma, \beta))} \quad (4.16)$$

will implement the second-best. Since the numerator is smaller and the denominator is larger in (4.15) compared to (4.12), $\theta^* < \hat{\theta}$. ■

Thus, due to the credibility problem present in the allocation of foreign aid it is optimal for an altruistic donor to delegate responsibility to a donor agency with less relative aversion to poverty. The intuition for this result is similar to that of the previous subsection. The second-best entails giving less aid for humanitarian spending to those countries in most need in order to induce more effort *ex ante*. A donor with less aversion to poverty will do just that, and the recipients will react by increasing adjustment efforts.

This finding may provide a rationale for the changes in aid-policy we have observed over the last decade with many bilateral donor agencies choosing to have closer ties, and even delegating responsibility, to multilateral institutions such as the World Bank and the IMF.

5. Some Preliminary Evidence

5.1. Empirical predictions and specification.

There are two empirical predictions of the model. First, without a commitment technology conditionality is not likely to be credible. Second, over time and across countries there ought to be a positive correlation, *ceteris paribus*, between fiscal imbalances,

i.e. budget deficits, and aid flows. The reason for this is twofold. First, for altruistic reasons, it is optimal to give more aid to countries with fiscal imbalances in order to maintain a desirable level of humanitarian spending in these countries. Second, if the recipient government correctly anticipates that aid flows will increase when the country faces fiscal difficulties, it may lack the incentives to avoid these deficits *ex ante*, which will make deficits more likely *ex post*.

The first prediction is difficult to test statistically due to lack of data.¹⁸ In this section we will instead concentrate on the second prediction which can be specified as a simultaneous system:

$$BB_i = \mathbf{x}'_i \boldsymbol{\alpha} + \alpha^A AID_i + \varepsilon_i \quad (5.1)$$

$$AID_i = \mathbf{z}'_i \boldsymbol{\phi} + \phi^B BB_i + \mu_i \quad (5.2)$$

where BB is government budget balance, AID is ODA as percentage of GDP, and where \mathbf{x}' and \mathbf{z}' are vectors of predetermined control variables. We will use two measures of the government budget balance. The first measure, $BB1$, is derived by combining data from the IFS data base and the World Tables, while the second measure, $BB2$, is derived using data only from the IFS data base. Since the World Tables provide data on grants for more countries, we use $BB1$ as our base measure for the primary budget account.¹⁹ However no qualitative result reported below hinges on the choice of budget balance measure.

In the base specification the vectors of exogenous variables, \mathbf{x}' and \mathbf{z}' , are given by:

$$\mathbf{x}' = [C \text{ GDP } GR \text{ TT}] \quad \mathbf{z}' = [C \text{ LGDP } GR \text{ LIFE } MOR \text{ LPOP}] \quad (5.3)$$

The control variables are chosen so as to mimic other empirical studies on aid. To minimize problems of reverse causation, these variables, unless otherwise noted, are measured at the start of the time period. The variable C is a constant, $LGDP$ is the log of real GDP per capita, GR is the growth rate of real GDP, TT is a terms of trade index, $LIFE$ is a measure of life expectancy, MOR is the infant mortality rate and $LPOP$ is the log of population.

The regressors $LGDP$, GR and TT are included in (5.1) to control for other factors than AID , that affect the budget account. We expect both α^{GR} and α^{TT} to be positive, whereas the sign of α^{GDP} is ambiguous. The important coefficient in equation (5.1) is α^A . According to the model, we would expect this coefficient to be negative. That is,

¹⁸The following quotation on the relationship between the Kenyan government and the donors, taken from *The Economist* (August 19th, 1995) seems to confirm the argument that conditionality is difficult to enforce:

Over the past few years Kenya has performed a curious mating ritual with its aid donors. The steps are: one, Kenya wins its yearly pledges of foreign aid. Two, the government begins to misbehave, backtracking on economic reform and behaving in an authoritarian manner. Three, a new meeting of donor countries looms with exasperated foreign governments preparing their sharp rebukes. Four, Kenya pulls a placatory rabbit out of the hat. Five, the donors are mollified and the aid is pledged. The whole dance then starts again.

¹⁹See appendix A.4.

expectations of higher aid flows in the case of fiscal difficulties will lead to lower effort *ex ante* to avoid these difficulties, and hence, worse expected budget account balance *ex post*.

The regressors $LGDP$, GR , $LIFE$, MOR , and $LPOP$ are included in (5.2) to control for other factors than the budget account, that might influence aid allocations to country i . If aid allocations are governed by recipient-need motives, we would expect ϕ^{GDP} , ϕ^{GR} , ϕ^{LIFE} to be negative, and ϕ^{MOR} to be positive. The coefficient ϕ^{POP} is expected to be negative because of a "population bias" in aid allocations.²⁰ From the model we predict that ϕ^B is negative. That is aid allocations by the donor community are responsive to budget difficulties of the recipients.²¹

The identifying assumptions of the simultaneous model (5.1)-(5.2) are exclusion of terms of trade in the aid allocation equation (5.2), and exclusion of population and the social indicators $LIFE$ and MOR in the budget account equation. These exclusions imply that equation (5.1) is over identified while (5.2) is just identified.

5.2. Empirical results

Table 3 shows the result of 2SLS regressions on the model (5.1)-(5.2), allowing for country-wise heteroscedasticity, when pooled 10-year averaged data are used.²² The sample constitutes of those countries where observations on both subperiods are available. Taking into account the possibility of simultaneous causality, we find that the effect of AID on BB is highly significant while the reverse effect is insignificant on conventional levels. However, the latter result is not surprising as the R^2 in the reduced-form regression with BB as independent variable is very low.²³ We can increase the R^2 values in the reduced-form regressions by including regional- and time dummies, column (3c)-(3f). As a result the significance levels as well as the point estimates of the endogenous variables increase considerably. However, the instrument for BB still only explains about 20 percentage of the variations in the primary budget deficit.

To improve the instrument for BB , we include several political and socio-political variables that might affect the budget balance.²⁴ Table 4 reports the result when measures of political instability, $PINS$, and polarization, POL , are used. The former is estimated by means of a probit model, with major government change as depen-

²⁰See for instance Trumbull & Wall (1994).

²¹Of course a negative sign on ϕ^B does not necessarily imply that the aid allocations are driven by altruistic concerns.

²²The Lagrange multiplier test strongly rejects the hypothesis of homoscedasticity in all regressions reported in table 3. The hypothesis that the off-diagonal elements of the covariance matrix are zero could, however, not be rejected on the 1 % significance level (cf. footnote 25).

²³The R^2 values in the first-stage regressions are 0.46 and 0.11 when AID and $BB1$ are regressed on the exogenous variables in the system.

²⁴See Alesina and Perotti (1994) for a review of the literature on the political economy of budget deficits.

dent variable, while *POL* is a measure of ethnic and linguistic fractionalization taken from Taylor & Hudson (1972).²⁵ Because time-series data are not available for the whole period, averaged 1970-89 data is used. As shown in table 4 the results improve considerably.²⁶ Independently of budget balance measure, the effect of *BB* on *AID* is now highly significant. Moreover, the reverse effect continues to be very strong. In particular, it is interesting to note that we cannot reject the hypothesis that the coefficient on *AID* is equal to one, on the 5 % significance level, in any of the estimations of equation (5.1) shown in table 3 and 4.

To test the robustness of the results, we run regressions on the extended sample of pooled 5-year averaged data. In column (5a)-(5b), the estimation is by 2SLS-fixed effects, while column (5c)-(5f), are estimated by 2SLS only. In both cases we allow the disturbance terms to be country-wise heteroscedastic, column (5a)-(5b), as well as correlated across countries, column (5c)-(5f).²⁷ The results in table 5, are similar to those of table 4. In particular, the R^2 in the first stage regression with *BB* as dependent variable, continues to be very low.

Finally, the results are also robust to alternative specifications and particular outlying observations. For instance, including other explanatory variables, such as different proxies for political instability and polarization as well as other measures of political and civil rights, do not change the qualitative result.

Thus we conclude from the preliminary data analysis that the empirical results are supportive of the general idea in this paper.

6. Conclusion

The present model has abstracted from a number of issues which influence the game between the donor and the recipient. The analysis is thus biased and it would be inappropriate to draw definite conclusions, let alone to make final policy recommendations. In particular, by looking at a two period model we have disregarded reputational forces. The fact that the donor/recipient game is played in a repeated fashion, may create forces that can substitute for commitment.²⁸ Nevertheless, some important insights emerge from the analysis, which contrast with most of the existing aid literature. First, conditionality is a way to deal with macroeconomic mismanagement. However, without a commitment technology, such a contract is difficult to enforce. *Ex post* it is optimal for a donor to no longer withhold aid to those in most need. The anticipation that this will happen will in turn affect the recipients' choices *ex ante*. Second, there are two possible arrangements under which the incentives for *ex post* recontracting are eliminated and which are able to sustain the second-best outcome,

²⁵See Svensson (1994) for a discussion of the variable *PINS*, as well as details on estimation.

²⁶In this case we raise the R^2 for the instrument of *BB1* to slightly above 0.4.

²⁷The Lagrange multiplier test due to Breusch & Pagan (1980) rejects the hypothesis of a diagonal covariance matrix (i.e. country-wise heteroscedasticity) for the regressions shown in (5c)-(5f).

²⁸See Svensson (1995).

namely delegating responsibility to a donor agency with less aversion to poverty, and tied project aid.

The empirical implication of the model is that aid induces weak fiscal discipline and that increased deficits lead to higher inflow of aid. We provide some preliminary support for this conjecture.

References

- [1] **Alesina A. and R. Perotti**, 1994, The Political Economy of Budget Deficits, *NBER Working Paper* No. 4637.
- [2] **Behrman J.R. and R.K. Sah**, 1984, What Role Does Equity Play in the International Distribution of Development Aid?, In: M. Syrquin, L. Taylor, L.E. Westphal (Eds.), *Economic Structure and Performance*, New York, 1984.
- [3] **Bjorvatn K.**, 1994, How Altruistic Should a Donor Be?, mimeo, Stanford University.
- [4] **Boone P.**, 1994a, The Impact of Foreign Aid on Savings and Growth, mimeo, London School of Economics.
- [5] **Boone P.**, 1994b, Politics and the Effectiveness of Foreign Aid, mimeo, London School of Economics.
- [6] **Breusch T. and A. Pagan**, 1980, The Lagrange Multiplier Test and its Applications to Model Specification in Econometrics, *Review of Economic Studies*, 47, 239-253.
- [7] **Cassen R and Associates**, 1986, *Does Aid Work?*, Oxford: Oxford University Press.
- [8] **Chenery H.B. and A.M. Strout**, 1966, Foreign Assistance and Economic Development, *American Economic Review*, 56 (September): 679-733.
- [9] **Dewatripoint M. and E. Maskin**, 1991, Credit and Efficiency in Centralized and Decentralized Economies, mimeo, Harvard University.
- [10] **Dornbusch R.**, 1991, Credibility and Stabilization, *Quarterly Journal of Economics*.
- [11] **Dudley L. and C. Montmarquette**, 1976, A Model of the Supply of Bilateral Foreign Aid, *American Economic Review*, vol. 66, pp.132-142.
- [12] **Frey B.S. H. Horn T. Persson and F. Schneider**, 1985, A Formulation and Test of a Simple Model of World Bank Behavior, *Weltwirtschaftliches Archiv*, Band 121, Heft 3, pp. 438-447.
- [13] **Frey B.S. and F. Schneider**, 1986, Competing Models of International Lending Activity, *Journal of Development Economics*, vol. 20, pp. 225-245.
- [14] **Gang I.N. and J.A. Lehman**, 1990, New Directions or Not: USAID in Latin America, *World Development*, vol. 18, pp. 723-732.
- [15] **Griffin K.**, 1970, Foreign Capital, Domestic Savings and Economic Development, *Oxford Bulletin of Economics and Statistics*, vol. 32, February, 99-112.
- [16] **Havnevik K.**, ed., 1987, *The IMF and the World Bank in Africa: Conditionality, Impact and Alternatives*, Scandinavian Institute of African Studies, Uppsala.
- [17] **Karlstöm B.**, 1991, *Det Omöjliga Biståndet*, SNS förlag, Stockholm.

- [18] **Kornai J.**, 1980a, *The Economics of Shortage*. Amsterdam: North-Holland.
- [19] **Kornai J.**, 1980b, 'Hard' and 'Soft' Budget Constraint, *Acta Oeconomica* 25, nos. 3,4: 231-45.
- [20] **Krueger A.O.**, 1989, *Aid and Development*, Baltimore, M.D., John Hopkins University Press.
- [21] **Laffont J.-J.**, 1989, *The Economics of Uncertainty and Information*, MIT Press, Massachusetts.
- [22] **Lindbeck A. and J. Weibull**, 1988, Altruism and Time Consistency: The Economics of Fait Accompli, *Journal of Political Economy*, vol. 96, no.6, 1165-1182.
- [23] **Maizels A. and M. Nissanke**, 1984, *Motivations for Aid to Developing Countries*, World Development 12 (September), 879-900.
- [24] **Mosley P.**, 1985, The Political Economy of Foreign Aid: A model of the Market for a Public Good, *Economic Development and Cultural Change*, vol. 33, pp.373-394.
- [25] **Mosley P. J. Hudson and S. Horrell**, 1987, Aid, the Public Sector and the Market in Less Developed Countries, *Economic Journal*, 97 (September), 616-641.
- [26] **OECD Geographical Distribution of Financial Flows to Developing Countries**, various issues, OECD, Paris.
- [27] **Pedersen K.R.**, 1993a, On Development Aid, Income Distribution, and Poverty Traps, *NHH Discussion Paper* 7/93.
- [28] **Pedersen K.R.**, 1993b, On Development Aid and Low-Investment Traps, *NHH Discussion Paper* 8/93.
- [29] **Persson T. and G. Tabellini**, 1990, *Macroeconomic Policy, Credibility and Politics*, Harwood Academic Publishers, London.
- [30] **Persson T. and G. Tabellini**, 1995, Federal Fiscal Constitutions, Risk Sharing and Moral Hazard, forthcoming in *Econometrica*.
- [31] **Qian Y. and G. Roland**, 1994, Regional Decentralization and the Soft Budget Constraint: The Case of China, *CEPR Discussion Paper* no. 1013.
- [32] **Rodrik D.**, 1995, Why is there Multilateral Lending?, *NBER Working Paper* no. 5160.
- [33] **SASDA**, 1994, *Evaluation of Swedish Development Cooperation with Zambia*, Report 6, Ds 1994:114, Ministry for Foreign Affairs.
- [34] **Svensson J.**, Investment, Property Rights and Political Instability: Theory and Evidence, IIES, Stockholm University, Seminar Paper No. 574.
- [35] **Svensson J.**, Can Reputational Forces Substitute for Commitment in Foreign Aid Policy, mimeo, IIES, Stockholm University.

- [36] **Summers L.H. and L.H. Pritchett**, 1993, The Structural-Adjustment Debate, *American Economic Review*, vol. 83, no.2, 383-389.
- [37] **Taylor C.L. and M.C. Hudson**, 1972, *World Handbook of Social and Political Indicators*, Yale University Press, New Haven.
- [38] **Trumbull W.N. and H.J. Wall**, 1994, Estimating Aid-Allocation Criteria with Panel Data, *Economic Journal*, 104 (July), pp. 876-882.
- [39] **White H.**, 1980, A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity, *Econometrica*, 48, pp. 817-838.
- [40] **White H.**, 1992, The Macroeconomic Impact of Development Aid: A Critical Survey, *Journal of Development Studies*, Vol.21, No 2.

1. Appendix 1

1.1. Optimal contract when adjustment effort is verifiable (first best)

For a given level of adjustment effort, $e_i = e$, the optimal contract is found by solving the following maximization program:

$$\max_{\{\mathbf{a}_1, \mathbf{a}_2\}} \sum_{i=1}^2 \sum_{s \in S} Q(s) u(C_i(s)) \quad i = 1, 2 \quad (1.1)$$

subject to:

$$\sum_{i=1}^2 a_i(s) \leq A, \quad \forall s \in S \quad (1.2)$$

$$\delta(z - e) + \sum_{s \in S} Q(s) u(C_i(s)) \geq W_i^{wa}, \quad i = 1, 2 \quad (1.3)$$

where:

$$C_i(s) = \frac{1}{2} (R_i + h(a_i(s))) \quad (1.4)$$

Using the budget constraint (1.2), we can substitute for $a_2(s)$. The problem then is to maximize expected utility with respect to \mathbf{a}_1 , subject to the IR-constraints (1.3). The Lagrangian for this problem is:

$$\max L(\mathbf{a}_1, \boldsymbol{\lambda}) = \sum_{i=1}^2 \sum_{s \in S} Q(s) u(C_i(s)) \quad (1.5)$$

$$+ \lambda_1 \left[\delta(z - e) + \sum_{s \in S} Q(s) u(C_1(s)) \right] + \lambda_2 \left[\delta(z - e) + \sum_{s \in S} Q(s) u(C_2(s)) \right]$$

where $\boldsymbol{\lambda}$ is a vector of Lagrange-multipliers. The first-order conditions can be written as:

$$\begin{aligned} & Q(s) [u'(C_1(s)) h'(a_1(s)) - u'(C_2(s)) h'(a_2(s))] \\ & + Q(s) [\lambda_1 u'(C_1(s)) h'(a_1(s)) - \lambda_2 u'(C_2(s)) h'(a_2(s))] = 0, \text{ for all } s \in S \end{aligned} \quad (1.6)$$

where the four constraints are given by (1.3) and the inequality constraints:

$$\lambda_i \geq 0, \quad i = 1, 2 \quad (1.7)$$

and where the complementary slackness conditions are:

$$\lambda_i \left[\delta(z - e) + \sum_{s \in S} Q(s) u(C_i(s)) - W_i^w \right] = 0, \quad i = 1, 2 \quad (1.8)$$

1.2. Optimal contract when adjustment effort is not verifiable

For a given level of adjustment effort, $e_i = \bar{e}$, the optimal contract is found by solving the following maximization program:

$$\max_{\{\mathbf{a}_1, \mathbf{a}_2\}} \sum_{i=1}^2 \sum_{s \in S} \bar{Q}(s) u(C_i(s)), \quad \text{s.t. (1.2), (1.3), and :} \quad (1.9)$$

$$\sum_{s \in S} \bar{Q}(s) u(C_i(s)) - \delta \bar{e} \geq \sum_{s \in S} Q(s) u(C_i(s)) - \delta e_i, \quad \text{for all } e_i \in [0, z], \quad i = 1, 2 \quad (1.10)$$

where $\bar{Q}(s)$ denotes the probability of aggregate state s , given adjustment level \bar{e} . Since $q(e)$ is concave and differentiable, and the total development spending scheme is nondecreasing, $v(e_i, e_j)$ is concave and differentiable. We can therefore replace the infinite set of relative incentive constraints for recipient i with a single "first-order constraint":²⁹

$$q'(\bar{e}) [\Theta_i - \Lambda_i] = \delta, \quad i = 1, 2 \quad (1.11)$$

where Θ_i and Λ_i are defined in section 2.4. The Lagrangian for this problem is:

$$\begin{aligned} \max L(\mathbf{a}_1, \boldsymbol{\lambda}, \boldsymbol{\nu}) = & \sum_{i=1}^2 \sum_{s \in S} \bar{Q}(s) u(C_i(s)) \\ & + \lambda_1 \left[\delta(z - \bar{e}) + \sum_{s \in S} \bar{Q}(s) u(C_1(s)) \right] + \lambda_2 \left[\delta(z - \bar{e}) + \sum_{s \in S} \bar{Q}(s) u(C_2(s)) \right] \\ & + \nu_1 [q'(\bar{e}) (\Theta_1 - \Lambda_1)] + \nu_2 [q'(\bar{e}) (\Theta_2 - \Lambda_2)] \end{aligned} \quad (1.12)$$

The first-order conditions can be written as:

$$\bar{Q}(s) [u'(C_1(\gamma, \gamma)) h'(a_1(\gamma, \gamma)) - u'(C_2(\gamma, \gamma)) h'(a_2(\gamma, \gamma))] \quad (1.13)$$

$$\begin{aligned} & + \bar{Q}(s) [\lambda_1 u'(C_1(\gamma, \gamma)) h'(a_1(\gamma, \gamma)) - \lambda_2 u'(C_2(\gamma, \gamma)) h'(a_2(\gamma, \gamma))] \\ & + q'(e) q(e) [\nu_1 u'(C_1(\gamma, \gamma)) h'(a_1(\gamma, \gamma)) - \nu_2 u'(C_2(\gamma, \gamma)) h'(a_2(\gamma, \gamma))] = 0 \\ & \bar{Q}(s) [u'(C_1(\beta, \beta)) h'(a_1(\beta, \beta)) - u'(C_2(\beta, \beta)) h'(a_2(\beta, \beta))] \\ & + \bar{Q}(s) [\lambda_1 u'(C_1(\beta, \beta)) h'(a_1(\beta, \beta)) - \lambda_2 u'(C_2(\beta, \beta)) h'(a_2(\beta, \beta))] \end{aligned} \quad (1.14)$$

²⁹See Laffont (1989) for the validity of the first-order approach.

$$\begin{aligned}
& -q'(e) (1 - q(e)) [\nu_1 u' (C_1(\beta, \beta)) h' (a_1(\beta, \beta)) - \nu_2 u' (C_2(\beta, \beta)) h' (a_2(\beta, \beta))] = 0 \\
& \quad \bar{Q}(\gamma, \beta) [u' (C_1(\gamma, \beta)) h' (a_1(\gamma, \beta)) - u' (C_2(\gamma, \beta)) h' (a_2(\gamma, \beta))] \quad (1.15) \\
& \quad + \bar{Q}(\gamma, \beta) [\lambda_1 u' (C_1(\gamma, \beta)) h' (a_1(\gamma, \beta)) - \lambda_2 u' (C_2(\gamma, \beta)) h' (a_2(\gamma, \beta))] \\
& + q'(\bar{e}) [\nu_1 (1 - q(\bar{e})) u' (C_1(\gamma, \beta)) h' (a_1(\gamma, \beta)) + \nu_2 q(\bar{e}) u' (C_2(\gamma, \beta)) h' (a_2(\gamma, \beta))] = 0 \\
& \quad \bar{Q}(\beta, \gamma) [u' (C_1(\beta, \gamma)) h' (a_1(\beta, \gamma)) - u' (C_2(\beta, \gamma)) h' (a_2(\beta, \gamma))] \quad (1.16) \\
& \quad + \bar{Q}(\beta, \gamma) [\lambda_1 u' (C_1(\beta, \gamma)) h' (a_1(\beta, \gamma)) - \lambda_2 u' (C_2(\beta, \gamma)) h' (a_2(\beta, \gamma))] \\
& - q'(\bar{e}) [\nu_1 q(\bar{e}) u' (C_1(\beta, \gamma)) h' (a_1(\beta, \gamma)) + \nu_2 (1 - q(\bar{e})) u' (C_2(\beta, \gamma)) h' (a_2(\beta, \gamma))] = 0
\end{aligned}$$

The six constraints are given by (1.3), (1.11) and the inequality constraints:

$$\lambda_i \geq 0, \quad \nu_i \geq 0 \quad i = 1, 2 \quad (1.17)$$

and the four complementary slackness conditions are, in addition to (1.8):

$$\nu_i [q'(\bar{e}) (\Theta_i - \Lambda_i) - \delta] = 0, \quad i = 1, 2 \quad (1.18)$$

By symmetry, $\lambda_i = \lambda$, $\nu_i = \nu$ and $C_i(\gamma, \beta) = C_j(\beta, \gamma)$ for $i = 1, 2$, $j = 1, 2$, $i \neq j$. By concavity of $u(\cdot)$ it is the only solution. Hence, the first-order conditions can be rewritten as (2.26)-(2.27).

1.3. Numerical example

In this appendix we provide a numerical example to show that the assumptions of the analysis above are consistent and do not define the empty set. To simplify we assume that the adjustment effort choice is binary. Hence; $e_i = \{0, 1\}$, where $e_i = 0$ is "low effort" and $e_i = 1$ is "high effort". Let $u(c_i) = \ln c_i$, $\gamma = 16$, $\beta = 10$, $A = 12$, $q(1) = 0.7$, $q(0) = 0.4$, $\delta = 0.1$ and $z = 1$. The function $h(a_i)$ is assumed to be linear with a unity coefficient.

Inserting the parameter values into condition (2.10), where $q'(e_i)$ now is replaced with $(q(1) - q(0))$, gives the result that recipient i would choose a higher effort in a situation without aid. In the discretionary equilibrium, on the contrary, the recipient would choose low effort. However, this would not be the case if the two recipients could cooperate. Hence, the optimal effort level in the cooperative equilibrium is $e = 1$. Evaluating welfare in the contract equilibrium and the discretionary equilibrium respectively, we have that:

$$W_D^2 = 4.62$$

$$W_i^2 = 2.31$$

$$W_D^3 = 4.36$$

$$W_i^3 = 2.28$$

1.4. Variable definitions

The total sample consist of 66 countries, from 1970-1989. Unless otherwise stated, all variables are averages over 5 years (1970-74, 75-79, 80-84, 85-89), and 10 years (1970-79,80-89).

AID= ODA as percentage of GDP. [Source: ODA data from OECD Geographical Distribution of Financial Flows to Developing Countries, various issues. GDP data from World Tables (1993/94).]

BB1= Budget balance. The difference between revenues, on the one hand, and expenditures and lending minus repayments on the other for the central government, as percentage of GDP. [Source: budget data in local currency is taken from the IFS data base (1992). However, these data include grants in revenues. To correct for this, we subtract grants as reported in the World Tables (1993/94). Data for GDP and conversion factors are from the World Tables (1993/94)].

BB2= As above but with subtraction of grants as reported in the IFS.

LGDP= Log of real GDP per capita in (1980 international prices) at the start of the subperiod. [Source: Barro & Lee (1994)].

GR= Growth rate of real GDP per capita. [Source: Barro & Lee (1994)].

TT=Terms of trade shock (growth rate of export minus growth rate of import prices, accept for the period 1985-1989 where it is the change in terms of trade. [Source: Barro & Lee (1994), World Tables (1993/94)].

LPOP= Log of total population in millions. [Source: World Tables (1993/94)].

LIFE= Life expectancy at age 0, at the start of the subperiod. [Source: Barro & Lee (1994)].

MOR= Infant mortality rate at the start of the subperiod. [Source: Barro & Lee (1994)].

ASIA=Dummy variable for Asia.

LATIN=Dummy variable for Latin and South America.

SSA= Dummy variable for Sub-Saharan Africa.

OIL= Dummy variable for OPEC members.

PINS=Measure of political instability. Estimated by means of a probit model with major government change as dependent variable (average 1970-82). [Source: Svensson (1994)].

POL=Ethnic and linguistic fractionalization around 1960. [Source: Taylor & Hudson (1972)].

Table 1

Total aid disbursed 1970-1990:		US \$ 714.5 billion (1985 prices)		
Sources of aid:				
Multilateral		0.24		
Bilateral		0.76		
Aid as a fraction of GDP from donor countries (DAC)				
1970		0.34		
1980		0.35		
1990		0.34		

ODA as share of GDP	mean	stdev	min	max
pooled sample	0.075	0.097	-0.002	0.603
subperiod 70-74	0.043	0.046	0	0.253
subperiod 75-79	0.071	0.085	0.001	0.438
subperiod 80-84	0.083	0.106	-0.002	0.555
subperiod 85-89	0.099	0.122	0	0.603
averages 70-89	0.077	0.081	0.0003	0.370

Total Net Capital Flow (in % of total)					
	ODA total	Official non- concessional flows	Export credits	Private flows	Total
Least developed countries	87	5	4	4	100
Low-income countries	66	8	7	19	100
Lower middle- income countries	29	17	10	44	100
Upper middle- income countries	14	6	7	74	100

Source: OECD various issues and Krueger (1989).

Table 2

Correlation matrix

AID	1								
BB1	-0.59	1							
LGDP	-0.54	0.19	1						
GR	0.01	0.21	-0.11	1					
TT	-0.03	0.03	0.02	0.16	1				
LIFE	-0.46	0.11	0.77	0.02	-0.01	1			
MOR	0.44	-0.09	-0.72	-0.02	0.04	-0.95	1		
LPOP	-0.26	0.22	-0.10	0.10	0.02	0.01	0.06	1	
BB2	-0.45	0.86	-0.05	0.20	-0.01	-0.11	0.11	0.24	1

Table 3

Pooled cross-country regressions on aid and budget account

Expl.v.	BB1 (3a)	AID (3b)	BB1 (3c)	AID (3d)	BB2 (3e)	AID (3f)
Const.	0.074 (0.117)	0.294 (0.215)	0.033 (0.092)	0.024 (0.222)	0.096 (0.117)	-0.186 (0.538)
BB1		-0.221 (0.857)		-0.739 (0.462)		
BB2						-1.100 (0.851)
AID	-0.717** (0.267)		-0.848** (0.235)		-0.820** (0.268)	
LGDP	-0.014 (0.014)	-0.040 (0.026)	-0.011 (0.010)	-0.019 (0.018)	-0.021 (0.014)	-0.008 (0.041)
GR	-0.105 (0.242)	0.052 (0.196)	-0.028 (0.266)	-0.029 (0.218)	-0.070 (0.336)	-0.058 (0.398)
TT	-0.020 (0.053)		-0.029 (0.060)		-0.001 (0.082)	
LIFE		0.001 (0.002)		0.002 (0.002)		0.002 (0.003)
MOR		0.282 (0.330)		0.490 (0.289)		0.774 (0.462)
LPOP		-0.014 (0.011)		-0.008 (0.010)		-0.001 (0.023)
ASIA			0.007 (0.014)	0.012 (0.017)	0.035 (0.027)	0.053 (0.060)
LATIN			0.015 (0.021)	-0.002 (0.030)	0.025 (0.040)	0.033 (0.081)
SSA			0.034* (0.016)	0.020 (0.039)	0.061 (0.027)	0.078 (0.115)
OIL			0.024 (0.019)	0.005 (0.018)	0.019 (0.028)	0.001 (0.041)
TIME			0.008 (0.014)	-0.012 (0.018)	0.005 (0.018)	-0.004 (0.034)
no.obs.	112	112	112	112	84	84
R2	0.11	0.47	0.28	0.61	0.26	0.60

Note: 2SLS estimation on pooled 10 year averaged data, standard errors in parenthesis. *
 (**) denotes significance at the 1 (5) % level. The standard errors are adjusted for country
 specific heteroscedasticity.

Table 4

Pooled cross-country regressions on aid and budget account

Expl.v.	BB1 (4a)	AID (4b)	BB2 (4c)	AID (4d)
Const.	-0.057 (0.074)	0.306** (0.084)	0.057 (0.105)	0.310** (0.108)
BB1		-0.380** (0.137)		
BB2				-0.567* (0.215)
AID	-0.677** (0.169)		-0.650** (0.210)	
LGDP	-0.003 (0.008)	-0.032** (0.006)	-0.017 (0.012)	-0.034** (0.008)
GR	0.246 (0.205)	0.304 (0.176)	0.076 (0.302)	0.247 (0.238)
TT	-0.267** (0.095)		-0.192 (0.104)	
LIFE		-0.001 (0.001)		-0.001 (0.002)
MOR		0.036 (0.260)		0.067 (0.302)
LPOP		-0.013** (0.003)		-0.012** (0.004)
PINS	0.195 (0.154)		0.217 (0.158)	
POL	0.042* (0.016)		0.019 (0.022)	
no.obs.	58	58	47	47
R2	0.39	0.67	0.26	0.64

Note: 2SLS estimation on averaged (1970-89) data, standard errors in parenthesis. * (**) denotes significance at the 1 (5) % level. The standard errors are based on the heteroscedasticity consistent covariance matrix due to White (1980).

Table 5

Pooled cross-country regressions on aid and budget account

Expl.v.	BB1 (5a)	AID (5b)	BB1 (5c)	AID (5d)	BB2 (5e)	AID (5f)
Const.			0.075 (0.046)	0.081 (0.178)	0.142** (0.027)	0.002 (0.293)
BB1		-1.452 (1.003)		-0.675 (0.540)		
BB2						-1.360 (1.022)
AID	-0.668** (0.160)		-0.878** (0.054)		-0.712** (0.063)	
LGDP	0.008 (0.018)	0.017 (0.074)	-0.017** (0.004)	-0.019 (0.015)	-0.029** (0.003)	-0.005 (0.030)
GR	0.379** (0.115)	0.547 (0.479)	0.365** (0.095)	0.300 (0.207)	0.437** (0.148)	0.720 (0.554)
TT	0.002 (0.019)		-0.016 (0.021)		-0.009 (0.028)	
LIFE		0.002 (0.004)		0.001 (0.001)		-0.002 (0.004)
MOR		1.401 (0.983)		0.410** (0.088)		0.426 (0.455)
LPOP		0.069 (0.074)		-0.001 (0.008)		0.005 (0.018)
ASIA			0.001 (0.014)	0.001 (0.020)	0.031 (0.020)	0.044 (0.058)
LATIN			0.018 (0.010)	0.001 (0.034)	0.046** (0.015)	0.076 (0.098)
SSA			0.024 (0.022)	0.008 (0.039)	0.045* (0.021)	0.062 (0.093)
OIL			0.027** (0.008)	0.007 (0.021)	0.047* (0.019)	0.027 (0.039)
no.obs.	223	223	226	226	171	171
R2	0.69	0.75	0.29	0.52	0.27	0.50

Note: 2SLS-fixed effect estimation (column 5a-5b) and 2SLS estimation (column 5c-5f) on pooled 5 year averaged data, standard errors in parenthesis. * (**) denotes significance at the 1 (5) % level. The standard errors are adjusted for country specific heteroscedasticity (column 5a-5b), as well as correlation across countries (column 5c-5f). Regressions (5c)-(5f) include three time dummies not reported here.

Table 3

Pooled cross-country regressions on aid and budget account

Expl.var.	BB1 (3a)	AID (3b)	BB2 (3c)	AID (3d)	BB1 (3e)	AID (3f)
Const.	0.035 (0.042)	0.197** (0.07)	0.141** (0.054)	0.180 (0.095)	-0.019 (0.059)	0.195 (0.100)
BB1		-0.391** (0.044)				-0.310** (0.047)
BB2				-0.309** (0.053)		
AID	-0.674** (0.071)		-0.570** (0.089)		-0.607** (0.076)	
LGDP	-0.010 (0.06)	-0.030** (0.006)	-0.024** (0.007)	-0.033** (0.008)	-0.007 (0.007)	-0.028** (0.007)
GR	0.352** (0.095)	0.119 (0.074)	0.358** (0.128)	0.129 (0.097)	0.359** (0.103)	0.179* (0.080)
TT	-0.007 (0.026)		-0.009 (0.038)		-0.022 (0.028)	
LIFE		0.001 (0.001)		0.001 (0.001)		0.001 (0.001)
MOR		0.303 (0.190)		0.489 (0.252)		0.454* (0.220)
LPOP		-0.009** (0.002)		-0.011** (0.003)		-0.012** (0.002)
ASIA					0.013 (0.015)	-0.007 (0.012)
LATIN					0.029* (0.013)	-0.020* (0.010)
SSA					0.028 (0.014)	-0.014 (0.013)
OIL					0.034* (0.014)	-0.005 (0.011)
no.obs.	226	226	171	171	226	226
adj.R2	0.34	0.55	0.22	0.42	0.37	0.58

Note: OLS estimation on pooled 5 year averaged data, standard errors in parenthesis. *
 (**) denotes significance at the 1 (5) % level. Regressions (3e)-(3f) include three time
 dummies not reported here.

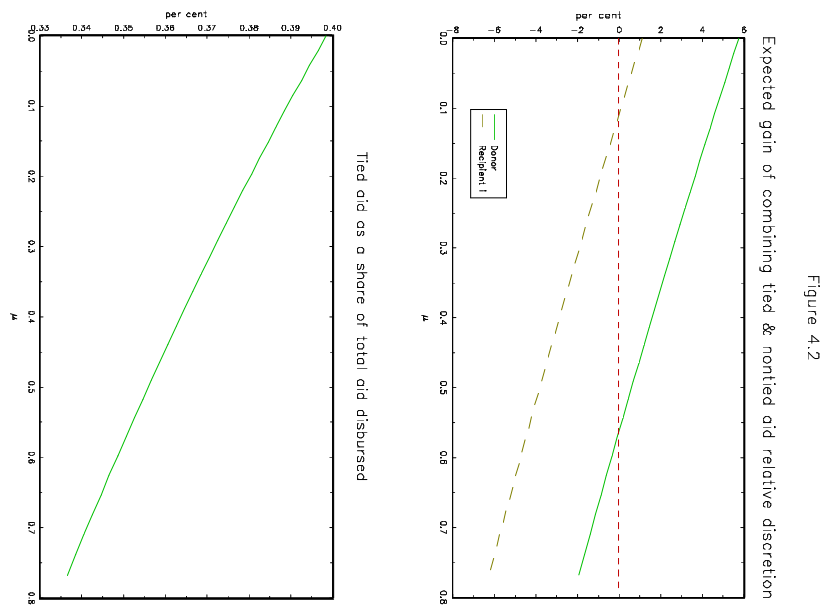


Figure 1.1:

Fig. 4.2